

Dr. Parsons's Report to the Local Government Board on Typhoid Fever in the Totnes Urban and Rural Sanitary Districts, and on the General Sanitary Condition of those Districts.

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THE Registration District (Union) of Totnes has an area of 97,914 acres, and contained in 1871 a population of 35,557. It includes the municipal boroughs of Totnes and Dartmouth, and the local board districts of Paignton and Lower Brixham, with a part of that of Ivybridge. The remaining portion of the district, with an area of 85,721 acres and a population of 17,027, is under the jurisdiction of the Guardians as Rural Sanitary Authority.

This inspection, made in November 1880, was ordered by the Local Government Board in consequence of typhoid fever having been unduly prevalent in 1879-80 in the borough of Totnes, and for several years past in different parts of the rural district.

TOTNES RURAL SANITARY DISTRICT.

The Totnes Registration District extends from the English Channel (Torbay) on the east to the hills of Dartmoor on the west, but the coast is mostly occupied by the urban sanitary districts of Paignton, Lower Brixham, and Dartmouth. The tidal estuary of the Dart, however, with its numerous creeks and branches, runs up far inland through the rural district. The district is very hilly, that is to say, there is no level ground, the whole surface being a succession of steep slopes and narrow valleys, although, with the exception of the Dartmoor Tors, none of the elevations attain any notable height. Except on the western border, which touches the granite of Dartmoor, the geological formation is Devonian, usually slaty in character, but with numerous bosses of hard limestone and trap. The slate or "shillet" is much contorted, and traversed by numerous joints; it abounds in springs. The soil is fertile, mostly pasture, and the bottoms and lower slopes of the valleys, as high as it is practicable to convey streams, are laid out as water meadows, and are under irrigation through the winter. The inhabitants of the villages on the Dart estuary are engaged in fishing, boat-building, and other maritime pursuits. The woollen manufacture is carried on on a large scale at Buckfastleigh, and to a small extent at other places in the district, and on the borders of Dartmoor there are a few copper and tin mines. In the remaining parts of the district the population is purely agricultural.

VITAL STATISTICS.

The following figures are taken from the tables accompanying the annual reports of the Medical Officer of Health, deaths of paupers belonging to the rural district in the workhouse at Totnes being added. It deserves notice in reading this table that it relates to a period just following on a severe epidemic of scarlet fever.

Year.	Births.		Deaths.		Deaths in 1st Year of Age.		Deaths from							
	Number.	Rate per 1,000 Population.	Number.	Rate per 1,000 Population.	Number.	Per 100 Births.	Smallpox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping Cough.	Fever.	Diarrhea.	Violence.
1876	—	—	267	15.7	46	—	—	3	7	—	1	8	4	11
1877	458	26.9	262	15.4	32	7.0	—	—	3	—	—	9	4	10
1878	448	26.3	285	16.7	51	11.4	—	—	—	—	9	6	7	6
1879	536	31.5	317	18.6	58	10.8	—	3	7	—	2	10	6	11
1880	491	28.9	300	17.6	53	10.8	—	2	3	2	19	13	10	7
Average	483	28.4	286	16.8	48	10.0	.00	.09	.23	.02	.25	.54	.36	.53
Standard rural districts, during same period.		28.7		14.2		10.1	.03	.28	.23	.19	.35	.22	.48	.39
Rates per 1,000 population per annum.														

TYPHOID FEVER.—On examining the returns of deaths, and making inquiries as to the circumstances in which deaths from the various forms of continued fever had occurred, I found that, although there had been some scattered cases—mostly of doubtful nature—in isolated places, yet the great majority of the fatal cases had occurred in distinct groups, and in certain particular localities.

With few exceptions, the scattered cases have either a history of probable or possible importation, or the “fever” has probably not been of a specific infectious nature. The following were the certified causes in some of these latter cases:—“Confinement, six days; typhoid fever, four days;” “typhoid pneumonia, $3\frac{1}{2}$ days” (æt. 64), “Bilious fever, five days” (æt. 73), and “Febris verminosus.”

The grouped cases may be considered, without much risk of error, to have been all cases of typhoid (enteric) fever, for although in some of them the cause of death was certified as “typhus,” the difference appeared to be one of nomenclature determined by the appearance of the skin, and the amount of abdominal symptoms, rather than one of nature. Thus in several instances cases occurring in close connexion, even at the same time in the same family, were called, some “typhus,” others “typhoid;” in other instances of so-called “typhus,” the nature of the sequelæ, *e.g.*, hæmorrhage from the bowels, pointed to typhoid rather than to typhus.

The places visited by me with reference to outbreaks of fever were Harberton, Galampton, South Brent, Ugborough, and Buckfastleigh. The circumstances attending these several outbreaks have been as follows:—

Harberton.—This village lies in a low damp situation in a valley, a brook running through it. Fever was prevalent here in the latter half of 1877 and the beginning of 1878. The first case was a farmer’s daughter, aged 16, who came home ill from a boarding-school at Totnes, and died on June 18th, the cause of death being certified as “Typhoid fever, 16 days; Melæna.” It is stated that the body was kept unburied, contrary to the advice of the medical attendant, until the eighth day. The farmer’s remaining family consisted of nine persons, of whom three subsequently had well-marked attacks of fever, one fatal, and three others had what were thought to be slight attacks of the same complaint. The next cases after the first were two sons, who were taken ill in the hay-field, 2 or 3 miles from home, on July 6th. The fourth case, a son aged 11, died on July 31st, the certified cause being “Typhus fever, eight days.” The three slight cases occurred subsequently in younger children. The body of the son was buried in the same grave in which that of the daughter had been previously interred; it was a brick grave, but the coffin of the first corpse had not been sealed down by a stone slab, and was exposed when the grave was reopened for the second funeral. It is stated that swarms of flies issued from the grave. The mode in which the fever was propagated among the members of this household cannot after this lapse of time be ascertained. The excreta were at first thrown into the privy, and later on were by medical advice buried in an orchard at a distance from the house. The privy abuts on the house, but a stream of water flowing continually through it washes away the excreta, and no offensive smell was perceptible at the time of my visit. There is no drain in the house, the only drain inlet being in the back yard, not very near doors or windows. Water is obtained partly from a spout fed by a spring issuing from the hillside above, partly from a pump well about 20 feet deep on a higher level than the house, and apparently not very likely to be polluted by sewage. The water was pronounced by the county analyst to be only a second-rate water, but fit for use. The members of the family who were subsequently attacked had been into the chamber of those first ill.

The next case was a farm labourer who worked in the hay-field with the farmer’s sons, and was taken ill at the same time with them. He used to go to the farmhouse every morning for orders, and occasionally ate there. The party drank cider in the hay-field, carrying it with them in a keg from the farmhouse. The cottage in which this man lived is the middle one of a row of three, in a low damp situation hardly above the level of the brook which runs past the end of the row. At the back of the cottages is an open gutter running into the brook. Water is obtained sometimes from the brook just

above where the gutter discharges, but more generally from a spring at a little distance above. The privy for the three cottages has a wet open soil-pit, but is at a distance from the houses; the back premises at the time of my visit were in a filthy state. The excreta of the man who had fever were commonly thrown into the brook, which enters the village at this point, but is not used for drinking lower down. Cases of fever subsequently occurred in both of the other cottages of this row. In the one next the brook a young man of 23 began to be ill about the time that the first case was getting better; in the cottage on the other side, which is separated from that in which the first case occurred only by a lath-and-plaster partition, there were two cases. The first, a young man of 21, was taken ill about the end of August or beginning of September, and died on November 10th; the other a girl, sister to the first, began to be ill shortly before he died.

A woman residing in another part of the village, who nursed these cases, was taken ill of fever about December, 1877. When she was convalescent, her husband took the disease and died on February 14th, 1878, the cause of death being certified as "Typhus fever, one month, hæmorrhage from bowels, 13 days." After him the five children suffered from slighter attacks. The house in which this family resided was not overcrowded, having three bedrooms. There was then no privy; the excreta of the fever patients were disinfected with quicklime, and buried in the garden, which is at a distance from the house.

Another case, said to be typhoid, began in November, 11 days after the patient's confinement. Some of the persons in attendance may have been in communication with households in which fever then existed. The sanitary condition of the premises was then far from satisfactory. The back yard is narrow and confined by high walls. The privy, then a cesspit privy, but now provided with a hopper and drained into the sewer, is close to the larder door and nearly over the well from which water is obtained. There was then an old rubble stone drain with an untrapped inlet in the back yard; this drain has since been piped and trapped.

In a cottage in an open situation and in a different part of the village, a girl of 13, died on October 31st, 1877, of "typhus fever, five days." No communication with the other cases is known. There were then two walled drains, one on either side of the well, one of which was stopped up, causing a nuisance and probably contaminating the drinking water.

The remaining case was a child of 17 months old, who died on November 11th, the certified cause being "Typhoid fever, six days." A rough stone drain then ran under the house, the untrapped inlet being close to the back door; it has since been piped and trapped. The privy, which serves for six houses, is at a distance; it discharges into a huge pool of liquid filth in a garden at the back.

Altogether 21 cases set down as "fever" occurred in Harberton between June, 1877, and February, 1878, six of which died, three of the deaths being certified as from "typhus" and three from "typhoid." Eight households were affected. Except the three cottages by the brook, these all obtained their water supply from different sources, and their drainage went in different directions. Milk was procured both from the farm where the first cases occurred and from the cottage next the brook, but I am unable to say that there is any evidence to show that the disease was distributed by the agency of milk supply. Personal intercommunication appeared to have most to do with its spread from family to family.

A new pipe sewer has been laid down in part of Harberton, in other parts there are old stone sewers partly choked with sediment; all terminate in the brook, but the sewage which enters the stone sewers mostly soaks away into the ground.

The water supply is derived chiefly from two public cisterns with taps, fed by springs above the village; close to one of these cisterns is a very filthy public privy, said to be the property of the churchwardens, and used by the occupants of some Feoffee houses and by other persons who have no privies of their own. A few yards above this cistern there is also an old dipping well, now used as a receptacle for slops.

At East Leigh, a hamlet of Harberton, there have been a few cases of typhoid fever at various times. No history of introduction was made out, but there are local nuisances in the immediate neighbourhood of the cottages where the

fever occurred. A well at East Leigh, from which some of the inhabitants used to get their drinking water, was condemned by the county analyst; it has been closed, and water from another source has been brought down in pipes to take its place.

Ugborough.—In this village about 22 cases of typhoid fever, with six deaths, occurred between February and August, 1879. The site of the village is saddle-shaped; in the centre is the Market Place, a wide open space surrounded by houses, from which Littlebourne Street descends to the N.E. and Modbury Street to the S.W. On the N.W. the ground rises into a hill on the side of which the Board Schools are situated, and on the S.E. is a smaller eminence on which the church stands. There are a few houses in yards on the E. and S. sides of the Market Place. The streets in Ugborough are drained by old square stone sewers. There is one such sewer in Littlebourne Street, discharging into a brook which crosses the street at the bottom. In Modbury Street there are two sewers: one begins at the Board Schools, and runs down the street, receiving the drainage from houses on the S.E. side; the other, at the back of the row of houses on the N.W. side, receives the drainage from them. The sewage is used for irrigating water meadows, the two streams of sewage joining in the open air.

The water supply is derived chiefly from a conduit in the middle of the Market Place. This is fed from two sources, a spring outside the village, and a reservoir near the Board Schools. During the winter months (from about November to May) the spring water is used for irrigating water meadows, and during that time the conduit is fed entirely from the reservoir. The reservoir is a tunnel 6 ft. in diameter, dammed up at the mouth, and driven about 30 ft. into the hillside, with a bore-hole at the farther end, which taps a spring. Nine yards distant from the reservoir is the closet belonging to the schoolmaster's house; this closet has a pan, and is connected with the sewer which runs down Modbury Street, but is flushed by hand. In the spring of 1879, the drain from the closet got choked, and sewage leaked from the joints. It is suspected that sewage percolated through the rocks into the reservoir, for when the latter was opened, some black slime was found oozing from the face of the rock. To this contamination of the reservoir the Medical Officer of Health attributes the outbreak of fever in Ugborough. While not prepared to deny the possibility of this explanation being correct, I find difficulties in the way of accepting it, the chief being the partial distribution of the fever. Thus the inhabitants of the houses in the Market Place, who all draw water from the conduit, entirely escaped the fever, as also did those in Littlebourne Street (30 houses). It is true that there is a spout in the latter street from which the inhabitants in part get their water; but in dry weather this spout does not run, and then they resort to the conduit, as also do those habitually who live at the end of the street nearest the Market Place. On the other hand in Modbury Street 12 cases of fever occurred, 7 out of 31 houses being affected. In the lanes between the church and Modbury Street, three cases occurred, three out of 12 houses being attacked. In a yard behind the Ship Inn, three of the four houses had one case each. The two remaining cases were, one in a house at the east end of the village, and one at the Board School-house.

The first case occurred on or about February 6th, 1879, in a house near the bottom of Modbury Street on the N.W. side. The patient was a young man, a carpenter, who worked in places in the neighbourhood, and may have contracted the disease in the course of his work, though no history of infection could be ascertained. The privy at this house discharges its soil into an open hole dug in the earth at the back; into this hole the privy roof drips, and storm water is also conveyed by a ditch. Thirty feet distant from this privy, and on a lower level, is a well from which at that time the water supply of this house was obtained. People living in the neighbouring houses also resorted to it by permission of the occupants, instead of fetching water from the conduit, which is at a greater distance. A brother and sister of the first patient were taken ill by the end of February, and several other cases in the same street during March. It seems probable that percolation from the privy infected by the excreta of the first case may have reached the well, and that the use of the contaminated water may have conveyed the disease to other houses in the street.

In close proximity to several of the houses in which fever occurred are drain inlets, at that time untrapped, from which offensive odours arose, and it seems

likely that the effluvia from specifically infected sewers may have helped to spread the disease. On this supposition the escape of the houses in the Market-Place and Littlebourne Street may be explained, as these drain in an opposite direction. The mode in which the inmates of the houses between the church and Modbury Street may have contracted the disease, unless through drinking the conduit water, is not clear. Three houses were affected, each in a different row, the other houses of the rows having escaped. They drain into the Modbury Street sewer and the yard gullies were formerly untrapped, and were complained of as offensive, but it is stated by the Inspector of Nuisances that at that time the drains were not connected with the sewer, and merely led into cesspools. In two of the houses the first case occurred in March, in the other later on in the summer.

In the yard behind the Ship Inn the cases occurred in the summer. This yard is ill-paved and in a filthy condition; there is no privy, all refuse matters being thrown on a heap in the yard. What drainage there is goes into a ditch at the back. The houses are below the level of the ground behind them, and one of them has a pigsty against its back wall. The case at the Board School-house began at the end of April, *i.e.*, not until after most of the other cases had occurred.

Of the patients 5 were adult men, 3 adult women, and 14 were children. So far as could be ascertained the dates of commencement of the several cases were as follows :—

	February	-	-	-	3
	March	-	-	-	7
	April	-	-	-	4
	May	-	-	-	—
About	June	-	-	-	3
„	July	-	-	-	1
	August	-	-	-	1
	Not ascertained	-	-	-	3
					<hr/>
					22
					<hr/>

On the occurrence of the fever being reported to them, the Totnes Rural Sanitary Authority appointed a parochial committee for Ugborough, by whom, under the advice of the Medical Officer of Health, certain remedial measures were carried out: among others, the water from the reservoir was shut off from the conduit (this was done before April 21st, 1879); the reservoir was thoroughly cleansed, the school-house closet drain cleared and relaid with properly cemented joints; the outfall of the sewer in Modbury Street was carried down by pipes to a distance from the houses; many of the house drains were reconstructed with glazed pipes and traps; and the conduit water was brought down to a tap in the lower part of Modbury Street. These steps seem to have been successful in arresting the disease.

South Brent.—In this village typhoid fever is almost endemic; it has not been absent any year, as far back at least as 1875. About 30 cases were heard of, occurring in 19 households. South Brent is situated on a high and open site, but the cottages are many of them old and dilapidated, built in confined situations, and as regards sanitary condition wretched in the extreme. The inhabitants are employed, some in agriculture, others at a flock manufactory. The main street is drained by two stone sewers, one of which discharges into a brook, the other upon a meadow; the outfall of the latter was formerly close to a house, but on the occurrence of several cases of typhoid fever in this house pipes were laid to carry the outfall to a greater distance from it.

There is a public supply of water brought down from a reservoir to taps in various parts of the village. The reservoir is supplied by a spring which rises in a water meadow on the hillside above. This water meadow is irrigated partly by a stream which receives the contents of the privy of a farmhouse, and the drainage of the farmyard; but the portion immediately above the spring is watered by another stream, though it would be possible to divert the stream from the farmyard over it. No fever has occurred at the farmhouse during the many years that the occupier has lived there. The overflow of the reservoir runs in an open stone channel down the side of the street. Dirty vessels, vegetables, offal, &c. are washed in this stream, and the Medical Officer of Health has

seen children on their knees drinking out of it; he has recommended that it should be diverted into the sewers in order to flush them.

Privy accommodation is scanty, one privy being sometimes shared by five, six, or seven houses. In such cases either the privy is allowed to get into a filthy condition, through disputes as to the responsibility for its cleanliness, or else it is not made use of, the men resorting to the fields, the women using utensils in the house, and throwing the contents of them on dung heaps.

A number of cases of typhoid fever occurred in 1877, in a group of wretched cottages in Fore Street, and behind the "Anchor" inn. One of these, then inhabited by a man, his wife, and 10 children, but now empty, has a living room of 1,670 cubic feet, and two bedrooms of together 1,450 cubic feet. The lower floor, of rough stone, is below the ground level; the bedrooms are only 6 ft. 6in. high to the roof, which is not ceiled, but merely plastered on the under side of the slates, and does not keep out the rain. One bedroom has a window of 10 square feet, of which a third opens; the other has only a skylight which will not open. There are no back windows, and the front of the house looks into a narrow passage, bounded by a high wall; 8 feet from the front door was the untrapped inlet of a stone drain, since trapped and piped. Close to this are six back-to-back houses, in two of which fever occurred about the same time; the stone drain above mentioned runs under one of the houses in which fever occurred, and there are untrapped gratings in the backyard close to the doors and windows. Next to this row, approached by an archway, is a narrow alley, the houses in which have no back windows, and in front a space only 6 feet wide, on the other side of which is a high wall. In three out of the five houses in this alley there have been cases of fever. In the alley there is an untrapped grating believed to lead into the drain before mentioned, and in the garden beyond is one privy shared by the five houses, the rough open cesspit of which receives much surface water, and has an outlet into the same drain. The Inspector of Nuisances informs me that notices have been from time to time served for the emptying and cleansing of this privy, but none to reconstruct it in such a manner as to prevent the recurrence of the nuisance. He has had much difficulty in getting owners of property in South Brent to carry out improvements, and legal proceedings against certain of them for the abatement of nuisances were pending at the time of my visit.

The other houses in which typhoid fever was known to have occurred were also visited, and at almost all of them similar conditions were found, or had existed; especially openings communicating with the sewers in close proximity to the houses, and frequently in confined situations. Although not bearing directly upon the question of fever production, it may be mentioned, as illustrating the general disregard of sanitary principles in South Brent, that at one house the window of the kitchen opened into a slaughter-house, and that immediately under the windows of the public meeting room of the village a huge heap of pig's dung was piled.

A group of cases occurred in 1878-79 at Brent Mill, a hamlet about half a mile below South Brent village. Water here is obtained partly from a dipping well or spring close to the River Avon and occasionally submerged. A neighbouring cottage, one of those in which fever occurred, has no privy, and all refuse is thrown upon the ground, not far from the spring.

Galmpton.—An outbreak of enteric fever occurred in this village in the summer of 1880, remarkable for its especial incidence upon the shipwrights employed in a boat-building yard. Galmpton, a hamlet of about 50 houses, is situated at the head of acombe down which a small streamlet runs to join a tidal creek of the Dart. The cottages are of a superior class, many of them being new. A plentiful supply of good water from a spring above the village is brought down to taps in different parts, and the general condition of the village as to cleanliness is favourable. It is to be remarked, however, that the whole of the sewage of Galmpton runs into the brook. The bed of the stream has in places been dug out to form catchpits for the collection of sediment as manure; these catchpits, besides being a source of nuisance, are believed to have facilitated the percolation of water into the ground. At Galmpton Kiln, two or three hundred yards lower down, where the brook enters the Dart, are some three or four houses, and also two boat-building yards. The situation is confined and sultry. At the point where the brook enters the creek there is a bridge, and above this there was formerly a tidal pond, called the Well Pond,

containing large banks of mingled sewage sludge and river mud, the effluvia from which, though unheeded by those accustomed to them, are stated by the Medical Officer of Health to have been most offensive and perceptible at a considerable distance. On the margin of the Well Pond was a spring or well, formerly much resorted to for drinking purposes by people at Galmpton Kiln. It is stated that the tide occasionally reached this well, but only when unusually high, as at equinoctial spring tides; it does not appear that it had done so during the time that the fever was prevalent. It is probable, however, that the spring may have become contaminated by percolation from the stream above, through fissures in the limestone rock over which it runs. It is stated that in dry weather the stream partly soaks away into its bed, and it is very probable that the water which disappears may reach the subterranean channel by which the spring is fed.

The first case of fever was a farmer in the lower part of the village, who was taken ill about May 2nd. He was in the habit of attending market at Totnes, and may have contracted the disease there, though no history of infection was ascertained. Several other cases subsequently occurred in his family. The watercloset at this house discharges into the brook by a pipe drain which runs near a well, from which water for drinking was drawn. It is stated that as soon as the nature of the disease was known, the excreta were disinfected and buried in the garden, instead of being thrown into the closet, but the washings of clothes were thrown into the drains without any disinfection. At the latter end of May several cases of fever commenced among workmen employed at the shipyard nearest the Well Pond, and among inmates of the adjacent houses. From this time till August cases continued to occur, the total number being about 30. Of these some 14 were shipwrights working in the yard next the Well Pond, three were children living at Galmpton Kiln close by the Well Pond; one was a shipwright working in the other yard, who would have to pass the Well Pond on his way to and from work; two others, although not employed at Galmpton Kiln, were known to have been in the habit of going there, and six occurred among members of the families of persons previously attacked. From these facts it would appear that the immediate cause of the fever existed at Galmpton Kiln, but whether this cause were the effluvia from the specifically infected sewage mud in the Well Pond or the drinking of sewage polluted water, or both conjoined, I am unable to say. At the boat-building yard next the Well Pond, where, out of 24 men employed, 14 suffered more or less severely from fever, the master informs me that the work being laborious, and the weather last summer hot and sultry, the men were in the habit of frequently resorting to the spring and drinking large quantities of water. At the other yard, which is at some little distance on the opposite side of the creek, out of ten men employed only one suffered; the men at this yard rarely drank the spring water, generally drinking rainwater from a cistern, or beer. Two or three of the shipwrights who suffered from fever lived at other villages in the neighbourhood, and came backwards and forwards daily to work. I am informed by the Medical Officer of Health that he found no sanitary defects at their houses, and that there were no cases of fever in those villages except the men who worked at Galmpton Kiln. It was stated by a resident at Galmpton Kiln that he had had members of his family ill with feverish attacks every summer for five out of the six past years.

The measures taken by the Sanitary Authority have been as follows:—The accumulation of mud in the Well Pond, amounting to some 70 cartloads, was removed, and the pond filled up with limestone rubbish, the stream being carried down to low water in a stone channel. The well adjoining has been dismantled and is disused, and water from the village service has been brought down in pipes to a tap at Galmpton Kiln. The bed of the stream has in places been cemented to prevent the water soaking away, and the catchpits in which sediment was formerly collected have been done away with.

Buckfastleigh (population in 1871, 2,638, but now probably considerably more) is a busy manufacturing village or small town, containing several large woollen factories, employing some hundreds of hands, as well as several other works, which derive their motive power in great part from the river Dart and its affluents.

A group of cases of fever, some 21 in all, with 3 deaths, occurred in the summer of 1880 at Buckfast, an outlying hamlet of Buckfastleigh, containing

two factories and some 40 houses. The first case was a boy aged 13, who died on June 17th, after about a fortnight's illness, the cause of death being certified as "suppressed typhus." He worked as a "half-timer" in the lower factory, and went to school in Buckfastleigh. No history of exposure to infection was ascertained, but he had been to Totnes to get a new suit of clothes a week or two before his illness. Four other cases subsequently occurred in the same family, others, 11 in all, in five cottages in the same or adjacent rows, and six in six other houses in different situations. The houses in one of which the first case occurred are new and well-built cottages at the lowest part of the village; they are well drained, the sewers being flushed daily from the mill-lead. In dry weather, as when the fever prevailed, many of the people in Buckfast resort for water to a pump well at the house of a Mr. L., who keeps a dairy and general shop. All the persons who had fever had been in the habit of getting water wholly or occasionally from this source. The inhabitants of a row of houses at the upper part of the hamlet who drink the water of the mill-lead where it enters the place, escaped with one exception, a young woman who had been to see her sister's child when ill of fever, and had drunk water from Mr. L.'s well. Mr. L. also supplies milk to most of the people in Buckfast. The well is about 10—12 feet deep; 20 yards from it and on higher ground is the privy, and about the same distance is a farm-yard, on the surface of which foul water lodges in pools. A stream of water from the mill-lead runs perpetually through the privy, and then away through a gutter of loose stone. The mill-lead at this point has received the excrement from the upper row of houses, and also from the closets at the upper factory. The well is sunk in a loose shaly rock, the dip of the strata being from the privy and gutter towards it. The water used at Mr. L.'s for drinking and dairy purposes was always boiled, and no cases of fever occurred in his household. One, however, occurred in the adjoining house, but not until August, two months after the commencement of the outbreak. The cause of the outbreak is obscure, but the circumstances appear to point to the use of the water of Mr. L.'s well as having probably been concerned in it. The well was opened by Mr. L. twice last year, once in the early part of the summer before the fever occurred, and again on September 9th. Mr. L. states that no foul matter was found in it. No analysis was made of the water.

In 1875 an epidemic of scarlet fever occurred in Buckfastleigh so severe as to receive special comment from the Registrar General in his third quarterly return for that year. Twenty-seven deaths took place from the disease in six months, in a population of probably not more than 3,000. This epidemic was reported on to the Sanitary Authority by the present Medical Officer of Health soon after his appointment in 1875. The origin of the disease was uncertain. The following extracts from Mr. Cape's report show what were the sanitary conditions under which the epidemic assumed so severe a character:—

"The spread and continuance of the disease I believe to be due to the following causes:—

"First, and chiefly, to the long continued habit of the people of keeping all things likely to make manure in open pits at the backs of their houses. Though to a great extent these nuisances have been removed, yet the pits where they were stored were of course saturated with foul and injurious matter, and are still open and liable to become during a rainy season pools of stagnant sewage.

"Secondly, I believe it to be owing to the crowding together both of houses on the ground and of people in houses.

"Thirdly, it is an undoubted fact that children from infected houses attended both the board school at Buckfastleigh and the school at Summersbridge. This I know by the admission of the master and mistress."

Mr. Johnson, surgeon, of Buckfastleigh, informs me that healthy children were frequently allowed to go into houses where others were lying ill or dead of scarlet fever, and that toys were lent from house to house.

The steps recommended by the Medical Officer of Health were as follows:—
 "Dig out, and then fill up all the old pits; rigorously enforce the law against all accumulations, and try to get the wealthy employers in Buckfastleigh to build more cottages, and proper sanitary accommodation for their work-people."

Since 1875 a good deal of improvement has been effected in the sanitary condition of Buckfastleigh, though much still remains to be done. The pre-

valent overcrowding has been abated by the erection of new cottages of a good class. There are, however, many old ones, some built on damp excavated sites, others back-to-back or without through ventilation, the windows being small, and not made to open sufficiently. Privy accommodation, though increased, is still insufficient, one privy being, in some instances, shared between from five to nine houses. Some of the privies have cesspits of very rough construction; the newer ones have a pan, and are connected with the sewers, the excreta being flushed away by pouring the house slops down. Pipe sewers have been laid down in some of the streets; they are not ventilated, but are flushed by a stream of water from an old mine adit, which runs continually through them. Some streets are still unsewered, and in those that have sewers some of the houses lie too low to be drained into them. All the sewage goes into the streams which run through the town; these streams are also polluted by the foul liquors discharged from the woollen factories and from a tanyard, and in summer time, when the water is low, the effluvia arising from them are complained of as being most offensive. There is no public water supply, water being obtained from wells in the fissured shaly rock, some of them near to privies.

The question of constituting Buckfastleigh an urban sanitary district was under consideration by the ratepayers at the time of my inspection.

SANITARY ADMINISTRATION OF THE TOTNES RURAL DISTRICT.—The sanitary business is transacted by the whole Board of Guardians. The meetings of the Sanitary Authority are held fortnightly, but it is found convenient to take the reports of the two Inspectors of Nuisances on alternate fortnights.

Mr. J. T. Cape, of Totnes, is appointed Medical Officer of Health for the whole district, at a salary of 100*l.* a year, of which one half is repaid from the Parliamentary grant. He is supplied with returns of deaths and of pauper sickness.

There are two Inspectors of Nuisances, at salaries of 33*l.* and 27*l.* respectively, no part of which is repaid to the Authority. The inspection of nuisances seems to be efficiently performed; legal proceedings are taken for their abatement if notices have not the desired effect.

Certain sewers have been constructed by the Sanitary Authority at Buckfastleigh, Upper Brixham, and Harberton. The Authority have supplied water to Ashprington and Diptford, have purchased waterworks at Kingswear, and have borrowed 1,000*l.* for waterworks for Upper Brixham. Improvements have also been made in the water supply at Dittisham and Stoke Gabriel. Other places in the district have been supplied by owners of property or other agency. Proper supplies of water are needed at Buckfastleigh and Dean Prior; at the latter place a mill-lead serves both as the common sewer and as the source of water supply.

Privy accommodation is deficient, many houses being unprovided. The older privies either have cesspits, rarely watertight, or are built over a stream, so that the contents are washed away. The Sanitary Authority contract for the removal of excrement at Higher Brixham and Kingswear. There are no byelaws in force in the district relating to the removal of excrement. Earth closets were tried at Buckfastleigh, but it is said that they did not answer, not being properly attended to. The newer closets are mostly provided with pans, the excrement being flushed away by pouring down water by hand.

Many of the streams in the district are more or less polluted by sewage and manufacturing refuse, and at Buckfastleigh, as before remarked, much resulting nuisance was complained of. As most of the places in the district have abundance of irrigable land in their vicinity, the diversion of sewage from the streams would be a comparatively easy matter.

No provision has been made for the isolation and hospital treatment of persons suffering from infectious diseases, except in the case of paupers, for whom there are fever wards at the Union Infirmary.

TOTNES URBAN SANITARY DISTRICT.

The borough of Totnes has an area of 1,362 acres; the population was 4,073 in 1871, and is probably about the same now. The inhabitants belong to the

classes usually met with in the market town of an agricultural district. The shipping trade is small, and there are no manufactures. The borough is of ancient date, and was formerly of considerable importance. The old town was surrounded by walls, of which the remains are still to be traced; but the present town extends in some directions considerably beyond their limits. It consists of two parts, Totnes proper in the parish of the same name, and Bridgetown in the parish of Berry Pomeroy; these two portions, anciently distinct boroughs, lie on the opposite slopes of a valley, and are separated by the river Dart, which is here crossed by a bridge. The tide extends as far as a mill weir about a mile above this bridge.

Totnes proper consists principally of a long steep street running in an east and west direction up the shoulder of a hill, and called in different portions of its length, Fore Street, High Street, and Leechwell Street. Fore Street and High Street contain the principal shops. Fore Street begins at the bridge. High Street is separated from Fore Street by an arch, a remnant of the old walls; it is steep and narrow, and the upper storeys of some of the houses are built out on pillars over the pavement. The churchyard adjoins it on the north side, abutting against the back walls of the houses on that side; the basement floors of some of these houses are as much as 15—20 feet below the surface of the churchyard. Burials in the churchyard have been discontinued for some years, but a damp heavy smell is said to be still sometimes perceived in the basements of the houses adjoining it. From Leechwell Street, at the upper part of the town, Cistern Street and Plymouth Road branch off. There are some other streets in the flat low-lying alluvial ground by the river, and there are also some back streets and alleys higher up in the old portion of the town. This part, viz., that between Leechwell Street and Fore Street, is very closely built, some of the houses having very little or no back space.

Bridgetown consists chiefly of a single street with a few alleys on either side.

The sewerage of Totnes is now being carried out according to plans designed by Mr. Appleton, C.E., and approved by the Local Government Board. The two parts of the borough have separate systems of sewers. On the Bridgetown side the main sewer and outfall tanks have been completed and the house connexions are in progress. There are two tanks for the storage and straining of the sewage, capable of holding half a day's flow; the outlet of the tanks is tide-locked for about two hours each tide, but it is said that the outfall of the sewer into the tank is always open. On the Totnes side the outfall is at present into a small creek which joins the river, but it is intended to construct outfall tanks similar to those on the Bridgetown side, at St. Peter's Quay, a little below the town. This site for the tanks was the one originally proposed when the sanction of the Local Government Board to the borrowing of money for sewerage works was obtained, but the Town Council afterwards wished to substitute for it a site on the Town Marsh, close to the town. The latter site however was disapproved of by Mr. S. J. Smith, C.E., one of the Board's inspectors, who held an inquiry in March 1877, and the Town Council ultimately reverted to the St. Peter's Quay site. It is stated that considerable difficulties were met with in procuring it, but these are now overcome and the work will be proceeded with without further delay. The present open outfall is complained of as being sometimes offensive, and occasionally the tide backs up it and covers a spring of which the water is used for drinking. Several cases of typhoid fever occurred in 1878 in an adjoining house. The main sewers on the Totnes side have been carried out at different times, but a large part of the work has been done during the past summer, and a portion of the houses, perhaps half, have been drained into them. The new sewers are of pipes, the largest sizes being 12 inches on the Bridgetown and 24 inches on the Totnes side. The older sewers were of brick or stone and of irregular construction. Some have been allowed to remain and connected with the new system. In Leechwell Lane an old 18-inch brick culvert is said to discharge into a 12-inch pipe. On both the Totnes and Bridgetown sides the sewers are in places not deep enough to drain the houses effectually, as the level of the back yards is lower than that of the street.

Certain houses in the Plymouth Road are drained separately into an open ditch, the sewage being used to irrigate a meadow.

No special means of flushing have been provided on the Bridgetown side. On the Totnes side a small stream, the overflow of the town reservoirs, is taken into the sewers, but in dry weather this ceases to run. It is proposed to construct an automatic siphon tank to increase the flushing power of this stream.

The sewers are ventilated partly by gullies at the sides of the streets, partly by special shafts. The latter, of which there are about 12 or 20 to a mile, are 4-inch, or sometimes only 3-inch, iron pipes, carried up buildings. The ventilating gullies in the populous parts of the town have the upper part of the mid-feather replaced by a flat wire basket containing charcoal, intended to purify the sewer air as it issues. The baskets, however, are not quite wide enough to fill the opening, and the charcoal gets shaken together so as to leave an empty space above it; hence it is possible for air to escape without passing through the charcoal. Water also overflows through the charcoal, clogging its pores with mud, and rendering it useless. Complaints have been made of effluvia arising from these gullies, and some of them have been removed by the Town Council. It would be better if the use of charcoal, which impedes seriously the passage of air, were abandoned. It is desirable that outlets for sewer air should be provided in safer positions, as, owing to the narrowness of the streets and pavements in the old part of Totnes, the gullies are necessarily very close to the houses. The number of ventilating shafts is about to be increased.

The older branch drains, of which many still remain, are roughly built of stone; many of them run under houses, and when opened they are frequently found in a bad condition. The new house drains are of socket pipes, and are disconnected from the sewer by a mason's trap. A properly constructed siphon trap of glazed ware would be preferable to a mason's trap, which is liable to retain foul matters and to become leaky. No opening for the inlet of fresh air into the drain is provided. The drain inlets are most commonly outside the houses. A good many of the houses in the High Street have waterclosets indoors, and in such cases it is a rare exception for the soil pipe to be ventilated. Some of the waterclosets are in very improper situations; in one case in a bed room, in others without light or external ventilation.

Excrement disposal was formerly effected entirely by privies with pits, and many of these still remain, though others have been replaced by closets with pans drained into the sewers, and flushed by hand. The cesspits are of rough construction, wet, and leaky. Some premises have no external means of access to the privy; in such cases, in order to avoid or lessen the nuisance of carrying the filth through the house, it is customary to bury it in the garden, or to pile it up in a heap to remain until dry. There is no public provision for the emptying of privies.

The water supply of Totnes comes from a couple of reservoirs on the hill-side above the town, into which water is brought from a spring half a mile distant. The same water is carried over the bridge to Bridgetown. There are public taps in various parts of the town, and water is also laid on into the houses of private consumers. The public and the private taps are supplied by distinct sets of mains. The service is ordinarily constant, but when the supply runs short it is sometimes necessary to shut it off during a portion of the 24 hours. During the exceptionally dry summer of 1880 the water was only turned on to private consumers for one hour in the day, and to the public taps for five hours. No closets, so far as I could learn, are flushed direct from the water-pipes. The quality of the water appears to be good.

In addition to the public service, water is obtained from one or two springs, and there are a good many private wells. In an old town like Totnes, built upon a loose slaty rock, and abounding in cesspits, old leaky drains, and other accumulations of filth, shallow wells are not a safe source of water supply. The water of some of them is said to be used only for cleansing purposes, but in a season of scarcity it is likely that it will be drunk for want of better.

The question of taking measures to improve the water supply of the borough is under consideration by the Town Council, and it has been proposed on the one hand to increase the storage capacity of the reservoirs, or, on the other hand, to take in another spring. From a sanitary point of view the latter would seem the preferable course, since water fresh from a spring is likely to be of better quality than that which has been stored in a reservoir; the overflow is also useful for flushing the sewers.

VITAL STATISTICS.

The table below is based upon the figures given in the annual reports of the Medical Officer of Health. From the total number of deaths, those of persons from other districts who have died in the Union Workhouse at Totnes have been deducted.

Year.	Births.		Deaths.		Deaths in 1st Year of Age.		Deaths from							
	Number.	Rate per 1,000 Population.	Number.	Rate per 1,000 Population.	Number.	Per 100 Births.	Smallpox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping Cough.	Fever.	Diarrhoea.	Violence.
1877	139	34.1	72	17.7	15	10.8	-	-	-	1	2	1	1	1
1878	98	24.1	75	18.4	20	20.4	-	1	-	1	-	2	-	-
1879	96	23.6	77	18.9	17	17.7	-	-	-	-	1	3	2	1
1880	119	29.2	82	20.1	21	17.6	-	5	-	-	7	7	4	3
Average	113	27.7	76	18.8	18	16.6	.00	.37	.00	.12	.61	.79	.43	.31
Rates per 1,000 population per annum.														

TYPHOID FEVER.—It is stated that cases of typhoid fever occur in Totnes every year. Three cases came to the knowledge of the Medical Officer of Health in 1877, ten in 1878, and eleven in 1879. During 1880 the disease has assumed larger proportions, about 50 cases of continued fever, most or all of them typhoid, having come to the knowledge of the Medical Officer of Health up to the middle of November last.

The cases in 1879, with one exception, all occurred in the last quarter of the year; most of them occurred in High Street, but three in Bridgetown, the first of the latter having probably contracted the disease in High Street. The first case occurred in June. The patient was in the habit of travelling about, and may have contracted the fever elsewhere. Another patient appeared to have contracted the fever in Torquay. In most of the houses where fever occurred local nuisances then existed, of a nature to contaminate the air of the house with sewer-effluvia, *e.g.*, defective and untrapped drains, and waterclosets out of order.

During the first half of 1880 only seven cases of fever were known, and some of these of a doubtful nature; but in August the disease appeared in several places and continued prevalent throughout the autumn. This increased prevalence of the disease could not be traced with any probability either to a fresh importation of the disease, or to the infection having gained access to new channels of communication. Two circumstances, however, may be mentioned as likely to have had considerable influence in extending it.

(1.) The first of these is the scarcity of water. At Totnes, as on the south-west coast generally, the summer of 1880 was exceptionally dry. At Torquay, nine miles from Totnes, the rainfall in the six months, April—September, 1880, was only 11.39 inches, against 21.73 inches, the average of the three preceding years. August especially was a hot and dry month, the rainfall being only 0.31 inches, and the mean temperature 61.2° F., as compared with 4.74 inches of rain and 59.2° F. mean temperature, the average of the three previous years. During this drought the yield of the spring which supplies Totnes with water greatly diminished, so much so that divided among the inhabitants of Totnes it would allow only two gallons each per diem. Hence it became necessary greatly to curtail the use of the water. As before mentioned, it was only turned on for the use of the inhabitants during a few hours daily, and there was none to spare for flushing drains. At this time offensive effluvia from the sewers were much complained of, due no doubt partly to the want of flushing, partly to the water in gully traps having evaporated. An attempt was made to remedy the deficiency by pouring down water from a water-cart twice a week, but it was only partially successful. It is probable also that waterclosets were frequently insufficiently flushed. Another effect of the scarcity of water was to induce people to resort to wells yielding water of bad or doubtful quality. This was found to be the case at some of the houses where fever had occurred.

(2.) During last summer and autumn the excavations for the new sewers in Totnes were in progress, the effect of which would be to disturb old

accumulations of foul matters, and allow effluvia to come up freely into the streets. It is probable that persons may have contracted disease by inhaling these effluvia.

The cases of fever have not been confined to any one part of the town; but they have occurred mostly along the course of the main street, Fore Street, High Street, and Lecchwell Street, in the low-lying streets by the river, and in Bridgetown. The cases in Bridgetown did not occur until October, and the earliest of them had contracted the disease on the other side of the river.

In my opinion in the generality of cases the infection has probably been received through the medium of sewage-poisoned air. In many of the houses in which cases have occurred, there have been opportunities for the entry of sewer air, such as indoor waterclosets with unventilated soil pipes, defective drains running under the house, or untrapped or inefficiently trapped sinks in or near it. In other cases the effluvia from foul privies or waterclosets on neighbouring premises were complained of. In the low-lying streets called Warland, there are or were old stagnant sewers, and the tide occasionally backs up the drains and floods the houses. In other cases the infection may have been conveyed by polluted well water. I know of no facts to show that the quality of the public water supply had any share in propagating the disease, though the insufficiency of the supply as regards quantity has, in all probability, tended largely to that result.

The fever has not been confined to persons using the town water, and among those who use this supply it has attacked alike persons procuring water from public and from private taps. As before mentioned, the public and private taps are supplied by distinct mains from the reservoir downwards. Though little was known about the condition of the intake, there does not seem any reason to suspect dangerous pollution of the water before it leaves the reservoir, and it is hardly probable that any contamination subsequently contracted would affect equally both services.

The persons attacked had obtained milk from various sources, and no special incidence of the fever upon the customers of any particular dairy was observed.

SANITARY ADMINISTRATION.—The Town Council are the Urban Sanitary Authority.

Mr. R. Jelley is Medical Officer of Health at a salary of 15*l.* per annum, half of which is repaid from the Parliamentary grant. He has not in former years made systematic inspection of his district; but in the spring of 1880 by order of the Town Council he made a house-to-house visitation throughout the borough, receiving some additional remuneration for the extra service. He receives returns of deaths from the registrar, but usually not until the end of the year.

The superintendent of the borough police is appointed Inspector of Nuisances under the Local Government Board's order, but has not long held office.

The Town Council have also a surveyor and a consulting engineer.

No byelaws have hitherto been in force in the district, but the Town Council have recently adopted byelaws on the model of those issued by the Local Government Board with respect to nuisances, common lodging-houses, new streets and buildings, and slaughter-houses.

The Town Council contract for the scavenging of the streets and for the removal of house refuse, but not for the emptying of privies.

The removal of nuisances has until lately been neglected. The house-to-house visitation made last spring brought to light the existence of a very large number of nuisances, and since then 200–300 notices have been served for their abatement, relating to such matters as the reconstruction of house drains and their connexion with the sewers, the conversion of privies into pan closets, and the abolition of cesspits. A good many of them have not hitherto been attended to, and the Town Council have not taken any legal proceedings against defaulters.

Some of the slaughter-houses in the town are in an unsatisfactory state.

The Medical Officer of Health has visited all houses in which cases of fever have come to his knowledge, and has given directions, verbal and printed, as to the measures to be taken to prevent its spreading. McDougall's powder has been supplied where necessary, and the sewers and house drains have been

flushed with water containing the same or with copperas solution. No hospital accommodation for persons other than paupers suffering from infectious diseases exists in the borough, and the question of providing it has not yet come under the consideration of the Town Council.

January 10, 1881.

H. FRANKLIN PARSONS.

RECOMMENDATIONS.

TOTNES RURAL SANITARY DISTRICT.

1. The Sanitary Authority should see that all parts of their district possess facilities, public or private, for the innocuous disposal of sewage and slop water. In the more populous places proper sewers should be constructed, with means of ventilation and flushing. Branch drains should be properly laid with glazed pipes, and should not be taken under houses; they should be properly ventilated, and should not be in direct communication with the interior of houses; all inlets in proximity to houses should be properly trapped.
2. The discharge of unpurified sewage into streams should not be permitted, and the Authority should take such steps as may be necessary and practicable to put a stop to other pollutions of streams where nuisance is occasioned thereby, or where the water is used for drinking.
3. Cesspit privies should be replaced, especially in the neighbourhood of dwellings or water supplies, by some more satisfactory arrangement. Where drainage and sufficient water are at hand, waterclosets may be used with advantage. Where there is a garden, a pail under the seat, into which dry earth is thrown daily, will be found a cheap and convenient arrangement. If a fixed receptacle for fecal matter is retained, it should be made as small as possible, kept above the level of the ground, rendered watertight, roofed over so as to exclude water, and ventilated. The privy should be so constructed as to allow the excrement to fall readily into the receptacle, and to be covered daily with dry earth or ashes.

Privies should be required to be provided for all houses which have not at present sufficient accommodation.

4. Proper supplies of water should be furnished to places in need of them, *e.g.*, Buckfastleigh and Dean Prior. The purity of existing supplies, public and private, should be watched over, and any that may be found in danger of pollution should be rendered safe. Polluted wells which cannot be secured against sources of pollution should be closed.
5. Houses which from disrepair, dampness, want of ventilation, or other cause are in such a state as to be injurious to health, should be closed until they have been rendered fit for habitation.
6. Surface cleanliness should receive attention. The surface of yards near houses should be properly levelled and paved, so as to prevent the lodgment of foul matters; and accumulations of manure and refuse should not be permitted in the immediate neighbourhood of dwellings.
7. When fever occurs, the bowel discharges of the patient should be disinfected immediately on being passed, and should not be thrown without disinfection into any privy or drain. Where possible they should, after due disinfection, be buried in the ground at a distance from any house or well. Soiled linen should be at once placed in a pan of water containing disinfectants.

For the kind of disinfectants to be employed, and their mode of use, the Sanitary Authority should consult their Medical Officer of Health.

8. The Sanitary Authority should take into consideration the advisability of providing by themselves, or in conjunction with some other Authority, a building for the reception of persons who may be suffering from infectious disease.

TOTNES URBAN DISTRICT.

1. The system of sewerage should be completed as soon as practicable by the construction of an outfall tank on the Totnes side, and by the construction of such additional branches as may be necessary for the drainage of those houses which cannot for want of fall or other reason be drained into the existing sewers. Adequate means of ventilation in safe situations and of flushing should be provided.
 2. All house premises within the prescribed distance should be drained into the sewers, by properly constructed house drains, trapped and ventilated on the principles set forth in the Model Byelaws issued by the Local Government Board. The soil pipe of every watercloset should be carried up full-bore to terminate above the roof. All other pipes for conveying waste water from a house should be carried through the wall, to discharge in the open air towards a trapped gully.
 3. Cesspit privies should be done away with and waterclosets or other improved appliances substituted.
 4. Steps should be taken under competent engineering advice for obtaining a more plentiful supply of water for the use of the town.
 5. Suspected wells should be examined, and if found to be polluted should be closed.
 6. Frequent and systematic inspection of the town should be made for the discovery of any nuisances that may exist, with a view to their abatement and the prevention of their recurrence. The appointment of inspector of nuisances should be made on such a footing as will allow the officer to devote a sufficient amount of time to the discharge of his duties. Manure, refuse, and other foul matters should be frequently removed, and should not be allowed to accumulate in the neighbourhood of houses and frequented places. Slaughter-houses and other premises liable to give rise to nuisance should be frequently visited. Legal proceedings should be taken against persons who fail, after due notice, to cause the abatement of nuisances for the existence of which they are responsible.
 7. On the occurrence of fever, disinfection of infected places and things, more especially the excreta of the sick, should be carried out under the directions of the Medical Officer of Health.
An apparatus for the disinfection by heat of such articles of clothing or bedding as cannot conveniently be washed, would be of advantage.
 8. The question of the advisability of providing a place for the treatment and isolation of persons suffering from infectious disease should receive due consideration from the Sanitary Authority.
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